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Early Indicators of Project Chaos[1]

A rush to start[2] in the face of a steep learning curve[3] in pursuit of "an airy fantasy"[4]

Lack of personnel and upheaval in senior management[5]

Lack of a final design[6]

Lack of quality control[7]

Laborious change management process due to lack of onsite authority[8]

Toxic relations between members of the construction consortium[9]

Failure of the module production process[10]

An angry, hostile reaction from the vendor, rather than acceptance of responsibility[11]

Pressure to approve production and downplay problems[12]

Downplaying importance of rules and qualifications[13]

Failure to inform the NRC[14]

Cancellation of NRC inspection due to chaos at the site[15]

Failure of NRC inspection[16]

NRC failure to provide close regulatory oversight[17]

Shutdown of the fabrication,[18] missed deadlines for delivery[19] and project delay20

1. This exhibit draws on two sources. A press account of the early days of the project as seen through the eyes of a senior nuclear procurement quality-assurance manager for Shaw Modular Solutions and the SCE&G-Santee Cooper "official complaint about those problems contained in a letter to the President of Westinghouse dated. May 6, 2014.
2. However, says Hartz, learning wasn't much of a priority in the rush to start work at Lake Charles. "They were clueless" about the complex geometry of nuclear welds, the nuclear supply chain and the need for a nuclear safety culture, he notes, adding, "I wasn't a whistle-blower. I was just a senior procurement manager who was concerned." *We regret that his letter is necessary and regret its length. Your poor performance has made both necessary. A complete description of our grievances would make the letter even longer. Consequently, we have chosen to focus on events and issues concerning structural modules. As well as certain design issues, and their combined effect on the expected completion date and cost of the project. (p. 1)*
3. To build the first new nuclear reactors in the U.S. in three decades—South Carolina's V.C. Summer Units 2 and 3 and Georgia's Plant Vogtle Units 3 and 4—the design and construction team would face a steep learning curve.
4. Shaw and Westinghouse believed they could ship the first modules—based on Westinghouse's heavily promoted new reactor design—to Georgia and South Carolina from the Lake Charles, La., fabrication plant of Shaw Nuclear's sister company, Shaw Modular Solutions. That goal proved to be an airy fantasy.
5. *Westinghouse: five Presidents, three Project Directors, and two Commercial Directors; Shaw acquired by SBI and five Commercial Directors, two Project Directors and two Construction Managers.... Senior managers who*

initiated project appeared to appreciate the significance of the task to our customers and the nuclear community at large... Evens indicate that this has been replaced by a different attitude, one that tis less focused and seems intent on taking advantage of our cooperative nature.

6. Westinghouse lacked some simple logistical sense that could have helped to finish the incomplete design, Hartz says. Westinghouse should have had engineers working at the offices of both Shaw and Westinghouse, which would have speeded up communication and helped quality,
7. During this time, Hartz was not familiar with any schedule that included quality-related activities—a big omission considering the major problems that would envelop the work. *The NRC inspection team determined that SMS was not fully implementing its quality assurance program in areas of triaging, design control, procurement document control, control of special processes, control of measuring and test equipment, control of nonconforming items, and corrective actions consistent with regulatory and contractual requirements an, and applicable implementing procedures.*
8. Giving an example of how the process got out of hand, Hartz says that, if a design called for a 3⁄8-in.-wide, 12-in.-long fillet weld, the welder might make it 14 in. long. "Instead of having Westinghouse right there saying, 'That's no problem,'" recalls Hartz, "we had to write a nonconformance report that was processed and reviewed by Shaw and then sent to Westinghouse for disposition. It was insane. From Lake Charles to Pittsburgh to Charlotte then back to Shaw Modular before the red nonconformance tag could be taken off,
9. But the result was that the Westinghouse-Shaw relationship became toxic. Due to mistakes in design drawings, Shaw Modular started keeping track of the hours spent dealing with the errors with the intention of billing the cost back to Westinghouse's Cranberry office. Mistrust simmered. *We should also mention that we have noted the evident deterioration of the relationship between senior management at Westinghouse and Shaw/SBI. (p. 2)*
10. Later in spring 2010, Hartz decided to send a Shaw Nuclear team to Lake Charles to conduct a quality-assurance performance-based audit. Southern Co., one of the V.C. Summer project's owners, also sent an inspector. Arriving in June, the 10-member team planned to work Monday through Wednesday. The team spent the three days gathering information about everything related to welding, including watching welds being made. Says Hartz, "We also talked to people buying weld rod, saw how it was stored and checked training documents and design documents." "It quickly became apparent there were serious problems. There were inferior welds and untraceable weld filler material," he says. Even worse, welders were stamping welds that they hadn't made themselves—an infraction that ultimately prompted the NRC to penalize Shaw.
11. When Hartz's concerns about quality and compliance problems led to Shaw Nuclear shutting down work at the plant during critical months in the second half of 2010, Hartz says he and another Shaw employee were met with an angry outburst by one of the company's senior managers. In a hastily arranged meeting at Lake Charles about the impending stop-work order, the senior manager hurled a letter opener head-high in the two men's direction.
12. It was presumed that Shaw Nuclear would be purchasing modules made by Shaw Modular, an arrangement that deprived the vendor and procurement quality-control staff of the arm's-length relationship that would have existed between two separate companies. That put Hartz in a bind. With Shaw Modular expected to be the supplier, the company needed to be on Shaw Nuclear's qualified supplier list. Hartz says he felt tremendous pressure to approve Shaw Modular. *The NRC advised CB&I of a "chilled work environment" at the lake Charles facility, which was causing employees to believe that they "are not free to raise safety concerns using all available avenues" and that "individuals have been retaliated against for raising safety concerns (p. 6).*
13. Shaw Modular's management personnel saw no difference between more typical industrial welds and nuclear ones, Hartz says. Talking to one of the welders and welding managers, Hartz recalls, "He'd say, 'It's just black iron welding,' and I'd say, 'No, it's nuclear welding with very specific rules.'" Since Shaw Modular had no welding standard in place, it needed to hire a degreed welding engineer with nuclear experience, in Hartz's view. "I asked about it, and they laughed at me," he said. Apparently, the Lake Charles management was satisfied that there was an American Welding Society (AWS) inspector, as well as other on-site welding engineers from equipment suppliers. Anticipating that some things would be fixed, Hartz granted Shaw Modular and Lake Charles conditional approval.
14. Although deeply critical of his former employer, Hartz doesn't put all the blame on Shaw for what happened in 2010. But correspondence between Shaw and the Nuclear Regulatory Commission, including notices of nonconformance with NRC standards, shows there already was serious trouble with Shaw's work in that year.
15. *The NRC attempted to inspect the SMS facility between January 10 and 12, 2012, but the inspection had to be "terminated early because of the current status of activities at SMS." To the NRC's apparent surprise, SMS had not yet made enough progress to make an inspection worthwhile.*
16. The NRC returned to inspect the SMS site between November 14 and `8, 2011. That inspection led to a "Notice of Nonconformance," dated January 6, 2012, based on deficiencies in SMS'a quality assurance program (p. 3)

17. The NRC also played a role, failing, in Hartz's view, to place inspection staff on site or close to Lake Charles, which would have sped up the communication and review process. "They should have had a resident inspector in Lake Charles and in Westinghouse's Cranberry Township, Pa., office, near Pittsburgh, for a first-of-a kind design,"
18. The visiting audit team gathered Wednesday afternoon to talk about what it had found. With everyone understanding the potential pitfall of work falling behind schedule if Shaw Nuclear were to exercise its stop-work authority over Shaw Modular, the audit team voted 9-1 to stop work.
19 *After the [August] 2012 agreement, you had no one to blame but yourselves... Contractor will not submit further Change Orders for any impact to Project Schedule for Contract Price associated with Structural Module Schedule delays and agrees that such further delays will be the responsibility of Contractor (p. 4) ... By December 4, 2013, all 72 CA-20 sub-modules had finally been delivered to the site, although 30 of the required documentation processing and repairs... As of February 2014, none of the 47 CA-01 sub-modules had been delivered, although 20 should have been.... Due to these design issues, documentation approving placement of CA-01 is not expected until August 31, 2014. (p. 10)*
20. *On September 3, 2013, Westinghouse informed us that it had identified problems with the design of the CA-04. The Consortium had planned to set that module on the Nuclear Island in September 2013, but it delayed that work because of the need to modify that concrete foundation. The foundation placement was then put on hold during the foundation redesign and associated procurement. (p. 10)*

EXHIBIT J
Chart A
Certain Risks Associated with Construction and Operation of the Facilities

Types of Risk	Schedule Delay	Increase Cost
1. Regulatory Risks		
a. Office of New Reactors		
i. New 10CFR52 licensing process proceeds slowly due to complexity and/or resource issues	Yes	Yes
ii. Intervention results in lengthy NRC hearings	Yes	Yes
iii. New NRC regulations issued causes scope additions	Yes	Yes
iv. ITAACs		
1. Resolution of ITAACs delays fuel load	Yes	Yes
2. New ITAACs causes scope addition	Yes	Yes
b. NRC Region II		
i. Construction Inspection Process proceeds slowly due to complexity and/or resource issues	Yes	Yes
c. FERC license approval process proceeds slowly due to complexity and/or resource issues	Yes	Yes
d. State & local permits process proceeds slowly due to complexity and/or resource issues	Yes	Yes
2. Engineering Risks		
a. Completion of design results in changes to existing design	Yes	Yes
b. Construction problems require design changes	Yes	Yes
c. Equipment vendors go out of business or change products	Yes	Yes
3. Procurement Risks		
a. Inadequate number of qualified suppliers	Yes	Yes
b. Manufacturing problems causes delays	Yes	Yes
c. Shipping problems delay equipment arrival to site	Yes	Yes
4. Construction Risks		
a. Construction duration estimates are too optimistic	Yes	Yes
b. Construction problems requires rework/repair	Yes	Yes
c. Labor issues (strikes/inadequate supply) causes delays	Yes	Yes
d. Lack of proper training results in mistakes	Yes	Yes
e. Large non-English speaking workforce	Yes	Yes
f. Workers do not meet new fitness for duty standards	Yes	Yes
5. Operational Risks		
a. Inability to hire sufficient qualified people to operate plants	Yes	Yes
6. Financial Risks		
a. Cost of money limits ability to raise sufficient capital	No	Yes
b. Rising inflation & competition drives equipment and commodity prices upward	No	Yes
c. Scope increases require additional funding	Yes	Yes
7. Uncontrollable Circumstances		
a. Severe weather	Yes	Yes
b. War/sabotage/terrorist attack	Yes	Yes

Source: Exhibit J: Risk Factors Related to Construction and Operation of the Facility, Combined Application of South Carolina Electric & Gas Company for a Certificate of Environmental Compatibility and Public Convenience and Necessity and for a Base Load Review Order, Public Service Commission Docket No. 2008-196-E, p. 1

RISK FACTORS DEMONSTRATING THE IMPRUDENCE SUMMER REACTOR CONSTRUCTION

REGULATION

Designs were not ready and had to undergo numerous revisions. Contracts were signed on the basis of the 15th design revision for the AP-1000, with the 16th pending, but it took several years and the 19th revision to get the design approved. (1) The initial reference plant was dropped. (2)

Waste Confidenc Water, Design issues, South Texas Propjet

Misleading (1, 4), Failed audit (1, 3), Incomplete Audit 2010 (1, 3, 4), Failed Rebar (VCM 7), Noncompliant (1), Plan changes 2012 (VCM, 7 , 8, 1), Failure to acknowledge and report problems (3, 4), Delayed COL (4),

EXECUTION

At each step of the initial construction, problems were encountered: Site specific problems like excavation, (4) initial concrete pour. (5) **Component quality problems, (6) transportation of major components to the construction site, (7) Procurement and training problems arose, (8) problems that had been predicted given the lack of a well- developed supply chain in the U.S. or globally, (9) and Lack of a fully integrated project schedule, incorrect construction techniques and faulty quality assurance paperwork. (10) As a result of the above problems, there was severe slippage of schedules at all the reactors for which revenues were being collected under advanced cost recovery statutes. Summer, (11), Vogtle, (12) Levy, (13) Turkey Point(14) Within a couple of months of the issuance of the license, the utilities that were moving ahead aggressively with construction were already haggling with the vendors over cost overruns, including a court case. (15)**

TVA Watts Bar, Progress, Levy, FP&L

Management turnover, 2008 (1), Exploitative attitude (1), Supply chain inadequacy (5), Labor Issues (VCN, 6,) Rush to Start (3), Insufficient schedule flexibility (3,), Poor performance (VCM 2-6, 1),Failure to resolve issues (VCM 6 Delay and cost 2011 (5), Poor quality (VCM, 6, 7, 2011 (1), 2012 (1), Missed Milestones (VCM 3-10,

FINANCE

Downgrades (24),Public Power (24)

TEPCO, Progress, FP&L, Public Power, South Texas Project, Austin, Jacksonville
Delay and cost (VCM, 3-10, 1, 5, 6), All delay on Westinghouse 2012 (1), Noncompliant (1)

POLICY

Sources of subsidized funding proved difficult to obtain. Federal loan guarantees became a focal point of attention, which made negotiation of terms more difficult, because the Federal government felt compelled to build in at least minimal protections for taxpayers. (22) Public power partners reduced their commitments to or backed out of nuclear construction projects, demonstrating the lack of a market for expensive nuclear power. (23) Climate change policy proceeded with targeted incentives, (20) standards, and technology specific mandates, rather than a big carbon costs. (21)

Loan Guarantees, Climate, Constellation, FPL Tax credit deadline (4)

TECHNOLOGY

The hope that multiple utilities would share the burden of getting the design to the finish line evaporated as the vast majority of utilities that were contemplating building nuclear reactors realized that nuclear construction was not economic and cancelled their projects. (3)

APR, AP1000, Constellation, South Texas Project

Faulty design (VCM, 7, 1), Unbuildable complexity (5), Poor design and continuous redesign 2013 (4), Lack of Plans (VCM 6, 7)

MARKETPLACE

As a result of all of the above, projected costs increased. The **projected increases in construction costs for the three EPC contracts that were signed ranged from half a billion to as much as six billion, even though fairly small percentages of total costs have been incurred to date (ranging from** 4% to about 20%). (16) Marketplace and regulatory factors also undermined the economics of nuclear reactor construction. The price of natural gas plummeted. (17) The cost of alternatives, like wind and solar also dropped. (18) Demand growth slowed dramatically. (19)

Gas, Demand, South Texas Project, Constellation, Cost: Levy, Constellation, South Texas Project, TVA, Lee, Harris, Turkey Point

Unlimited money attitude (5), Insufficient demand (4),

Sources and Notes: VCM = issues identified in *Brief of Southern Alliance for Clean Energy,* Fifteenth Semi-Annual Construction Monitoring Report, Dockett No. 29849, February 13, 2017; 1 = Letter of Lonnie Carter and Kevin Marsh in V.C. Summer 2 and 3 Guaranteed Substantial Completion Dates, May 6, 2014; 2 = Tony Bartelme, "Two identical projects, one in Georgia and one in South Carolina, Only one survived," *Post and Courier,* October 29, 2017; 3 = Richard Korman, ""Witness to the Origins of a Huge Nuclear Construction Flop," *Engineering New Record,,* November 1, 2017; Sam Fretwell, "Warnings Were Raised Years Before S.C. Utilities Abandoned Nuke Project," *The State, Engineering New Record,,* August 8, 2017; 5 = Ron Aiken, "Was 'Unbuildable' Design Nuclear Project's Undoing?," *Engineering New Record,, August 30,* 2017; 6 = "How Different are Vogtle and V.C. Summer projects?," *E&E News,* October 20, 2017.

Compilation as of July 2013, Mark Cooper, Report of Dr. Mark Cooper on The Economic Feasibility, Impact on Public Welfare and Financial Prospects for New Nuclear Construction, Prepared for Heal Utah, July 5, 2013, p. 63.

[1] The 15th revision of the AP1000 design was accepted by the NRC and the 19th was finally approved. Between these two actions, every revision became the basis for utilities moving ahead with advanced cost recovery – revision 15 (Levy County Units 1 and 2); Revision 17 (Turkey Point Units 6 and 7); Revision 18 (Vogtle Units 3 and 4 and Summer Units 2 and 3). The revision after the EPC contracts were signed reflected concerns about the shield building and other issues. World Nuclear News, More shield work on AP1000, 16 October 2009, http://www.world-nuclear-news.org/RS_More_shield_work_on_AP1000_1610091.html, **World Nuclear News, Westinghouse could suffer a setback in plans to deploy its AP1000 reactor after US regulators required more work on the shield building.** http://www.world-nuclearr ews.org/RS_More_shield_work_on_AP1000_1610091.html; Nuclear Engineering International News AP1000 shield building made 'regulatory issue' in UK, 16 February 2010 http://www.neimagazine.com/story.asp?storyCode=2055489, Nuclear Engineering International, AP1000 containment insufficient for DBA, engineer claims, 29 April 2010, http://www.neimagazine.com/story.asp?storyCode=2056229, ; Simon Lomax, Toshiba Design Questions May Slow U.S. Regulator's Nuclear Plant Approvals, Bloomberg, May 20, 2011 http://www.bloomberg.com/news/2011-05-21/toshiba-design-questions-may-slow-u-s-regulator-s-nuclear-plant-approvals.html, NRC Holds Up Westinghouse AP1000 Design Certification, Citing New Technical Issues, May 25, 2011, http://www.powermag.com/POWERnews/3751.html; Matthew l. Wald, Regulators Find Design Flaws in New Reactors May 20, 2011, http://www.nytimes.com/2011/05/21/business/energy-environment/21nuke.html?pagewanted=all&_r=0; Direct Testimony And Exhibits Of William R. Jacobs, Jr., Phd. On Behalf Of The Georgia Public Service Commission Public Interest Advocacy Staff, Before The Georgia Public Service Commission, *In The Matter Of: Georgia Power Company's Seventh Semi-Annual Vogtle Construction Monitoring Report,* Docket No.: 29849, December 7, 2012, *http://www.psc.state.ga.us/factsv2/Document.aspx?documentNumber=145142*

[2] NuStart COL Project - NRC Project No. 740, Transition of AP1000 Reference Plant COL Application, April 28, 2009, http://pbadupws.nrc.gov/docs/ML0912/ML091210083.pdf

[3] The owners group was scuttled when Westinghouse refused to let utilities that had not signed EPC contracts participate in the development of the design. By kicking them out of the group, Westinghouse raised the cost of the reactors to the remaining utilities, which increased the burden on the ratepayers of those utilities (See Cooper Testimony, 2012).

[4] Backfill: Kristi E. Swartz, "Utilities sue vendors in dispute at Vogtle," Atlanta *Journal Constitution*, August 27, 2012, http://www.ajc.com/news/business/utilities-sue-vendors-in-dispute-at-vogtle/nRMTK/; Bed rock: SCANA Corporation. "South Carolina Electric & Gas Company Reaches Preliminary Agreement on Negotiated Nuclear Costs." 29 March 2012.

[5] Direct Testimony And Exhibits Of William R. Jacobs, Jr., Phd. On Behalf Of The Georgia Public Service Commission Public Interest Advocacy Staff, Before The Georgia Public Service Commission, *In The Matter Of: Georgia Power Company's Seventh Semi-Annual Vogtle Construction Monitoring Report,* Docket No.: 29849, December 7, 2012, http://www.psc.state.ga.us/factsv2/Document.aspx?documentNumber=145142; Mud Mat: Rob Pavey, "Vogtle expansion sits under microscope," *Augusta Chronicle*, May 5, 2012 5:47 PM http://chronicle.augusta.com/latest-news/2012-05-05/vogtle-expansion-sits-under-microscope Southern Nuclear Operating Company. Electric Generating Plant Units 3 and 4 License Amendment Request Planning Information. 23 March 2012;; Roddie Burris, Slowdown at V.C. Summer nuclear plant brings layoffs, *The State,* Jan. 25, 2013, http://www.thestate.com/2013/01/25/2603871/slowdown-at-vc-summer-nuclear.html

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[7] Thomas Clements "Vogtle Nuclear Reactor Still Stranded in Savannah; Pouring of "Nuclear Concrete" for Reactor's Basemat Delayed Yet Again as Embarrassment and Costs Mount," Aiken Leader, Jan 22, 2013, http://aikenleader.villagesoup.com/p/vogtle-nuclear-reactor-still-stranded-in-savannah-pouring-of-nuclear-concrete-for-reactor-s-basema/951066

[8] Kristi Swartz, "Contractors at Vogtle Nuclear Plant Signal More Delays," *Atlanta Journal Constitution,* November 28, 2012, http://www.ajc.com/news/business/vogtles-contractors-signal-more-delays/nTGzZ/; Direct Testimony of Stephen A. Byrne on Behalf of South Carolina Electric & Gas, Docket No. 20008-196-E, Exhibit J: Risk Factors Related to Construction and Operation of the Facility; also attached to Mr. Byrnes Rebuttal Testimony in Docket No. 2012-203-E.

[9] The problems were widely anticipated early in the "nuclear renaissance," see for example, the Keystone Center, *Nuclear Power Joint Fact-Finding,'* June 2007, pp. 34-35 and the sources cited therein.

[10] Direct Testimony And Exhibits Of William R. Jacobs, Jr., Phd. On Behalf Of The Georgia Public Service Commission Public Interest Advocacy Staff, Before The Georgia Public Service Commission, *In The Matter Of: Georgia Power Company's Seventh Semi-Annual Vogtle Construction Monitoring Report,* Docket No.: 29849, December 7, 2012, *http://www.psc.state.ga.us/factsv2/Document.aspx?documentNumber=145142*

[11] Summer Unit 1 is nine months behind schedule, Ryan, Margaret. "Summer nuclear unit already behind as it gets federal green light;" SCANA Corporation. "South Carolina Electric & Gas Company Reaches Preliminary Agreement on Negotiated Nuclear Costs." 29 March 2012; Roddie Burris, Slowdown at V.C. Summer nuclear plant brings layoffs,

[12] Pam Sohn, Delays mire nuclear plant construction, *Times Free Press*, June 4th, 2012; http://www.timesfreepress.com/news/2012/jun/04/delays-mire-nuclear-plant-construction/ Rob Pavey, "Georgia Power Reports Costs, Challenges of Vogtle Expansion," September 1, 2012, *Augusta Chronicle,* http://chronicle.augusta.com/news/business/local-business/2012-08-31/georgia-power-reports-costs-challenges-vogtle-expansion; Ray Henry, "Watchdog: Ga. nuclear plant will exceed budget," Associated Press, May 31, 2012;

[13] Penn, Ivan. "Progress Energy raises price tag, delays start date of Levy nuclear plant." *The Tampa Bay Times*. 2 May 2012.http://www.tampabay.com/news/business/energy/progress-energy-raises-price-tag-delays-start-date-of-levy-nuclear-plant/1227830; Ivan Penn, May 29, 2012, "Progress Energy's Levy County Nuclear Project Carries On Despite Setbacks," *Tampa Bay Times,* http://www.tampabay.com/news/business/energy/progress-energys-levy-county-nuclear-project-carries-on-despite-setbacks/1232464

[14] The FPL Turkey Point project has been placed in a limbo mode, where the utility wants to continue spending money to obtain the license without committing to actually constructing the facility, a status that the Southern Alliance for Clean Energy contends violates the explicit language of the statute which allows advanced cost recovery only for facilities that the utility "intends" to construct. http://blog.cleanenergy.org/2012/10/22/sace-protects-consumers-challenges-florida-nuclear-tax/

[15] Kristi Swartz, "Contractors at Vogtle Nuclear Plant Signal More Delays," *Atlanta Journal Constitution,* November 28, 2012, http://www.ajc.com/news/business/vogtles-contractors-signal-more-delays/nTGzZ/; Direct Testimony of Stephen A. Byrne on Behalf of South Carolina Electric & Gas, Docket No. 2012-203-E.

[16] Direct Testimony And Exhibits Of William R. Jacobs, Jr., Phd. On Behalf Of The Georgia Public Service Commission Public Interest Advocacy Staff, Before The Georgia Public Service Commission, *In The Matter Of: Georgia Power Company's Seventh Semi-Annual Vogtle Construction Monitoring Report,* Docket No.: 29849, December 7, 2012, http://www.psc.state.ga.us/factsv2/Document.aspx?documentNumber=145142 ; Sohn, Pam. "Cost of completing reactor at Watts Bar Nuclear Plant rises by up to $2 billion," *Chattanooga Times Free Press.* 6 April 2012.http://www.timesfreepress.com/news/2012/apr/06/watts-bar-2-billion-more-and-three-years/; Rob Pavey, "Georgia Power Reports Costs, Challenges of Vogtle Expansion, September 1, 2012, *Augusta Chronicle,* http://chronicle.augusta.com/news/business/local-business/2012-08-31/georgia-power-reports-costs-challenges-vogtle-expansion; *Tom Crawford* , Ga. Power filing hints at $2 billion overrun on Vogtle nuke project, Georgia Report, *September 3, 2012;* Ray Henry, "Watchdog: Ga. nuclear plant will exceed budget," *Associated Press,* May 31, 2012; Ryan, Margaret. "Summer nuclear unit already behind as it gets federal green light;" SCANA Corporation. "South Carolina Electric & Gas Company Reaches Preliminary Agreement on Negotiated Nuclear Costs." 29 March 2012; Penn, Ivan. "Progress Energy raises price tag, delays start date of Levy nuclear plant." *The Tampa Bay Times*. 2 May 2012.http://www.tampabay.com/news/business/energy/progress-energy-raises-price-tag-delays-start-date-of-levy-nuclear-plant/1227830; Fred Hiers, "Progress asks for Nuke Fee Hike," May 1, 2012, *Ocala.com, http://www.ocala.com/article/20120501/wire/120509987;* Ivan Penn, May 29, 2012, "Progress Energy's Levy County Nuclear Project Carries On Despite Setbacks," *Tampa Bay Times,* http://www.tampabay.com/news/business/energy/progress-energys-levy-county-nuclear-project-carries-on-despite-setbacks/1232464; Trigaux, Robert. "Is nuclear power industry poised to repeat 'managerial disaster'?" *The Tampa Bay Times*. 8 April 2012.http://www.tampabay.com/news/business/energy/is-nuclear-power-industry-poised-to-repeat-managerial-disaster/1224045; The Southern Company. Form 10-Q (Quarterly Report for period ending 31 March 2012) filed with the United States Securities and Exchange Commission, pp. 137-140. 7 May 2012; SCANA Corporation. "South Carolina Electric & Gas Company Reaches Preliminary Agreement on Negotiated Nuclear Costs." 29 March 2012. The French have experienced similar problems with their advanced design reactors in construction projects in Finland and France.

[17] The most compelling evidence comes from the utility industry itself where the largest utilities concluded that building new nuclear reactors was not economic. The most prominent among these was the CEO of Exelon, the nation's largest nuclear utility, John Rowe, "Fixing the Carbon Problem without Breaking the Economy," Resources for the Future Policy Leadership Forum Lunch, May 12, 2010; "Energy Policy: Above All, Do No Harm," *American Enterprise Institute,* March 8, 2011;. Equally significant is the understanding of this process that had spread across the decision makers in other industries (see for example, Steel Manufacturers Association, May 2012, *Energy Update* http://www.steelnet.org/new/20120500.pdf,

[18] Galen Barbose, Naim Darghouth and Ryan Wiser, *Tracking the Sun V: An Historical Summary of the Installed Price of Photovoltaics in the United States from 1998 to 2011,* Lawrence Berkeley Laboratory, November 2012; Ryan Wiser, et al.,

Recent Developments in the Levelized Cost of Energy from U.S. Wind Power Projects, Lawrence Berkeley National, February 2012, http://www.nrel.gov/docs/fy12osti/53510.pdf; Ryan Wiser, and Mark Bollinger, *2011 Wind Technologies Market Report*, EIA August 2012, http://emp.lbl.gov/sites/all/files/eetd.lbl_.gov_EA_EMP_reports_lbnl-5559e.pdf

[19]The Economist, "Constellation's cancellation: America's nuclear renaissance is mighty slow in coming," October, 14, 2010, http://www.economist.com/node/17254442 The economic slowdown has reduced electricity consumption, which remains below the peak it reached in 2007. At the same time, there has been a sharp increase in the supply of non-nuclear electricity (gas, coal and wind) from plants built to meet a wrongly predicted spike in demand. Gas prices, which a few years ago were high enough to make power firms consider the nuclear option, are now much lower. Pessimism about the economy makes corporate America reluctant to undertake long-term capital investments. None of this bodes well for nuclear power. To make matters worse, America has failed to adopt a coherent energy policy, let alone one that imposes a price on carbon. Everyone in the energy business believes that carbon-pricing will come, but when? Wikipedia, *Prospective nuclear units in the United States,* "the case for widespread nuclear plant construction was eroded due to abundant natural gas supplies, slow electricity demand growth in a weak U.S. economy, lack of financing, and uncertainty following the Fukushima nuclear disaster, http://en.wikipedia.org/wiki/Prospective_nuclear_units_in_the_United_States

[20] Roger Avant, Roger, "Creating the Clean Economy," The Economist, June 11, 2011, http://www.economist.com/blogs/freeexchange/2011/01/climate_policy; David Leonhardt, "There's Still Hope for the Planet," New York Times, July 21, 2012, http://www.nytimes.com/2012/07/22/sunday-review/a-ray-of-hope-on-climate-change.html?_r=0.

[21] See Sections IV and V for a discussion of the importance of the carbon price assumptions..

[22] Edward Felker, "Poneman, Fertel Spar over Nuclear Loan Guarantees," *Energy Guardian,* September 18, 2012; http://www.energyguardian.net/poneman-fertel-spar-over-nuclear-loan-guarantees; Reuters, RPT-Southern Co CEO says US nuclear loan guarantee less enticing, July 19, 2012, http://www.reuters.com/article/2012/07/19/utilities-southern-idUSL2E8IJ1QM20120719

[23] http://www.businesswire.com/news/home/20120327006867/en/Fitch-Rates-South-Carolina-Public-Service-Auths; http://www.columbiabusinessreport.com/news/42877-duke-energy-moving-ahead-to-buy-stake-in-v-c-summer-nuclear-station; https://www.santeecooper.com/portal/page/portal/santeecooper/aboutus/newsroom/santeecoopernewsreleases/bd9094aabb8529bde044001a4b08f969; http://nuclearstreet.com/nuclear_power_industry_news/b/nuclear_power_news/archive/2012/04/25/santee-cooper-signs-letter-of-intent-with-american-municipal-for-v-c-summer-reactors-042502.aspx;

[24]https://www.moodys.com/research/Moodys-downgrades-the-senior-unsecured-rating-of-SCANA-to-Baa3?lang=en&cy=global&docid=PR_226074; https://seekingalpha.com/article/4103753-moodys-warns-continuing-southern-companys-plant-vogtle-nuclear-project-credit-negative; http://www.businesswire.com/news/home/20150515005713/en/Fitch-Downgrades-SCG-BBB--SCEG-BBB-Outlookh; Https://www.streetinsider.com/Downgrades/Fitch+Downgrades+IDRs+of+SCANA+%28SCG%29+and+Subsidiaries/4756172.html; https://www.platts.com/latest-news/electric-power/washington/vogtle-nuclear-plant-loan-guarantees-may-not-8123712 http://chronicle.augusta.com/metro/2010-04-29/southern-co-seeks-extension-consider-offer?v=1272590140

Understated Risks in the SCE&G Application: FoE Witness

Execution

Significant risks not adequately explored or valued (7)

Understated the likely cost by a significant margin (7)

Fails to adequately capture the risk of further increases (7)

The Company's schedule for construction of two proposed nuclear generation plants is subject to a great deal of uncertainty (33)

First of a Kind: No plant of this design has ever been constructed. When a design of a complex machine like a nuclear power plant is put into bricks and mortar (or concrete and piping) for the very first time, it is common for the engineers, architects and builders to discovers design issues that were not apparent in the design process. (34)

Rush to EPC: The Company determined that it had a window of opportunity expiring in 2008 to assess the nuclear option and to have a nuclear generation solution in place by the time of its forecast capacity shortfall (14)

Marketplace

Baseload Bias ("the company appears to have let its assumption that baseload generation plant would be the best resources to meet future needs dictate its planning form that point forward without considering and modeling, scenarios include intermediate and peaking options, including alternative sources of generation as well as demand side management. (14) The company has focused entirely on the nuclear option, and specifically on the AP-1000... In general, the Company's filing indicates that it gives insufficient weight to alternatives such as Demand Side Management, wind, solar and other resources (16-17)

Significant alternatives not adequately explored or valued (7)

DSM (8)

All generation options (8)

Load forecast (9)

Technology

Alternatives: "It is true that renewable sources of power have historically been more expensive than fossil generation… However, the cost of alternative forms of power are continuing to come down… the costs of nuclear power are high, and budgets and estimates for such plants are subject to considerable risk of understating the ultimate cost of such power. Estimates of both sorts of resources must be continually updated to reflect changes in their underlying costs and risks (20).

Financial

Serious doubts about the Company's ability to secure financing (8)

By 2019, assuming its cost estimates are correct, it will have more than doubled its capital investment… we saw in the first round of nuclear investment…when demand slacked off… costs escalated, and plants were delayed of even cancelled, many utilities in the 1970s and 1980s experienced severe financial distress. A less concentrated, more diverse and modular portfolio would be much less risky. (40-41)

Analysis of financing (8)

Lack of DOE loan guarantee (8, 36))

Nuclear risk premium: the Massachusetts institute of Technology in their 2003 study assumed a 3% return on equity risk premium for nuclear generation relative to coals and gas central station generation… MIT did not attempt to estimate the relative risk premium for… more modular resources such as alternative dispersed generation, a more varied portfolio, of demand side management… as a group they will have a lower risk profile, because investment in a portfolio of alternatives will not require such a concentration of risk in one project, as does the Company's proposal (40).

Policy

Protecting ratepayer from large cost escalations (8)

Putting aside the problem that the EPC contract is not public, it is likely that this arrangement with Westinghouse/Stone & Webster (Westinghouse) does not adequately protect SCE&G's customers from sources of cost escalation… this provision suggests an asymmetric allocation of risk away from Westinghouse and on to customers. Another major portion of cost are subject to escalation and are not limited by indices or other controls on the rate of escalation (37-38)

Diversity: A less concentrated, more diverse and modular portfolio would be much less risky. (41)

Regulation

Security challenges, on-site storage, (38-39)

Source: "Direct Testimony of Nancy Brockway," *In Re: Combined Application of South Carolina Electric and Gas Company for a Certificate of Environmental Compatibility and Public Convenience and Necessity and for A Base Load Order for the Construction and Operation of a Nuclear Facility at Jenkinsville South Carolina,* Docket No. 2008-196-E, October 17, 2008.

From: MARSH, KEVIN B [mailto:KMARSH@scana.com]
Sent: Thursday, September 05, 2013 5:29 PM
To: roderidl@westinghouse.com; pasherman@cbi.com
Cc: Carter, Lonnie; BYRNE, STEPHEN A; ARCHIE, JEFFREY B; BYNUM, ALVIS J JR; LINDSAY, RONALD; ADDISON, JIMMY E
Subject: Meeting with SCANA and Santee Cooper

Dear Danny and Phil,

I requested a meeting with both of you two weeks ago to discuss the status of our nuclear project. We and our partner Santee Cooper continue to have serious concerns about the consortium's ability to deliver modules from the Lake Charles facility. The consortium is now in its third year of unsuccessful attempts to resolve its manufacturing problems at the facility which continue to impact our project negatively. Your missed deadlines put potentially unrecoverable stress on the milestone schedule approved by the SC Public Service Commission. I don't have to remind you that continuing delays and cost overruns are unacceptable from a public perspective and could have serious effects. We need to meet.

Please consider 9/13 at 10am or after, 9/16 at 3pm, 9/18, or 9/20 as potential dates for a meeting. You can fly to our hanger at the Columbia Airport and we will meet in the conference room.

Thank You.

Kevin Marsh
SCANA Corportation
803-217-8097

May 6, 2014

Philip K. Asherman
President & CEO
CB&I
One CB&I Plaza
2103 Research Forest Drive
The Woodlands, TX 77380

Danny L. Roderick
President & CEO
Westinghouse Electric Corporation
1000 Westinghouse Drive, Suite 100
Cranberry Township, PA 16066

Subject: V.C. Summer Units 2 and 3 Guaranteed Substantial Completion Dates

Reference: (1) Engineering, Procurement, and Construction Agreement for AP 1000 Nuclear Power Plants, Dated May 23, 2008 – V.C. Summer Units 2 and 3

(2) VSP_VSG_002024, dated August 6, 2012

Gentlemen:

On May 23, 2008, we executed the EPC Agreement with the Consortium for Units 2 and 3 at our V.C Summer nuclear facility. That was an historic day for our companies. We would like to believe that it was equally significant to you. Together, we helped kick off what we continue to hope will be a new wave of nuclear construction in this country.

The V.C. Summer facility offers the best template for future projects. Although you signed EPC agreements with two other utilities at about the same time, both of

those projects are currently embroiled in major litigation. We chose a different path. We resolved to work with you amicably, believing that building the project cooperatively, on time and on budget, would be in the best interests of all involved.

The events since May 23, 2008 have tested our resolve. In this letter, we will review certain of those events for the benefit of your current management. We believe that such a review is called for because of the many turnovers in your management since May 23, 2008. With one possible exception, no one from your two companies who attended the signing ceremony is still involved in the project. Since then, Westinghouse has had at least two Presidents, three Project Directors, and two Commercial Directors. Shaw was acquired by CB&I, and has had comparable turnover, with five Commercial Directors, two Project Directors and two Construction Managers.

Before reviewing the relevant events, we wish to share with you our view that the management turnovers have been accompanied by a change in attitude. Senior managers who began the project appeared to appreciate the significance of the task to our customers and to the nuclear community at large, and exhibited a commensurate dedication. Events indicate that this has been replaced by a different attitude, one that is less focused and seems intent on taking advantage of our cooperative nature.

We should also mention that we have noted the evident deterioration of the relationship between senior management at Westinghouse and Shaw/CB&I. Repair of that relationship will likely be necessary if you are to satisfy our concerns. As a Consortium, the two firms are jointly and severally liable to us. It does not matter to us which of you caused a specific problem. We look to both of you to remedy all the Consortium's deficiencies.

We regret that this letter is necessary and regret its length. Your poor performance has made both necessary. A complete description of our grievances would make this letter even longer. Consequently, we have chosen to focus on the events and issues concerning the structural modules, primarily CA-20 and CA-01, as well as certain design issues, and their combined effect on the expected completion date and cost of the project. We selected these examples to illustrate our dissatisfaction. They are not an exhaustive listing of your every shortcoming.

I. THE EPC AGREEMENT ESTABLISHED THE PROJECT SHEDULE

The EPC Agreement stated the Consortium's commitment to meet following dates for Unit 2:

Activity	Unit 2
CA-20 On-Hook	November 18, 2011
CA-01 On-Hook	March 29, 2012
Guaranteed Substantial Completion	April 1, 2016

To meet these dates, it was essential that the Consortium timely complete module fabrication, delivery, and assembly. The Consortium selected Shaw Modular Solutions, LLC ("SMS"), an affiliate of the Consortium, as the module fabricator. Problems with SMS's work began almost immediately. The NRC attempted to inspect the SMS facility between January 10 and 12, 2011, but the inspection had to be "terminated early because of the current status of activities at SMS." To the NRC's apparent surprise, SMS had not yet made enough progress to make an inspection worthwhile.

By letter dated February 22, 2011, SMS advised the NRC of its expectations for module production and shipment, as follows:

> SMS expects to be at a high level of production of structural modules in early June 2011. SMS expects that shipment of the first structural sub-module will occur the end of June 2011. ... If schedule changes are necessary, SMS will promptly notify the NRC.

SMS did not meet these module production and shipment dates. We are unaware if it gave the NRC the promised notice of these failures.

The NRC returned to inspect the SMS site between November 14 and 18, 2011. That inspection led to a "Notice of Nonconformance," dated January 6, 2012, based on deficiencies in SMS's quality assurance program. The Notice of Nonconformance stated:

> During this inspection, the NRC inspection team found that the implementation of your quality assurance program failed to meet certain NRC requirements which were contractually imposed on you by your customers or NRC licensees. Specifically, the NRC inspection team determined that SMS was not fully implementing its quality assurance program in the areas of training, design control, procurement document control, control of special processes, control of measuring and test equipment, control of nonconforming items, and corrective actions consistent with regulatory and contractual requirements, and applicable implementing procedures.

II. THE AUGUST 6, 2012 AGREEMENT CHANGED THE GUARANTEED SUBSTANTIAL COMPLETION DATES

By July 7, 2012, only 21 of 72 CA-20 sub-modules had been delivered to the site. Despite the poor progress, you assured us that you had resolved the module production problems. This led to the Agreement of August 6, 2012.

The 2012 Agreement recites that it resolved several pending change order requests. An additional motivation for us was to enable you to put the past module issues behind you and have a fresh start. Section IV.A of that agreement established the following revised guaranteed substantial completion dates:

Activity	Unit 2	Unit 3
Guaranteed Substantial Completion	March 15, 2017	May 15, 2018

After execution of the 2012 Agreement, you had no one to blame but yourselves for future module delays. Section IV.D of the 2012 Agreement made clear that future module delays would be your sole responsibility. It stated in pertinent part:

> Except as otherwise provided for in Article 9 of the EPC Agreement or Section XII.D of this Agreement, Contractor will not submit further Change Orders for any impacts to Project Schedule or Contract Price associated with Structural Module schedule delays and agrees that such further schedule delays will be the responsibility of Contractor.

Although the parties released certain claims against each other in the 2012 Agreement, Section XII.D of the agreement stated that our release did not apply to any claims "that may arise hereunder from Contractor's failure to deliver the Structural Modules referenced in Section III.C of this Agreement, so as to achieve" the revised Guaranteed Substantial Completion Dates.

The 2012 Agreement imposed on the Consortium certain additional scheduling obligations to enable us to monitor module progress. Section IV.D of that agreement stated:

> In order to measure impacts to the Project Schedule associated with Structural Module delivery, Contractor agrees to provide a detailed Structural Module delivery and assembly baseline schedule within 30 calendar days of the execution of this Agreement and to report actual progress against this schedule on at least a monthly basis.

The Consortium prepared the new baseline schedule for module delivery and assembly, as called for in this Agreement, but it has not provided the monthly progress reports.

In sum, the Consortium decided to engage SMS, an affiliated entity, as the module fabrication subcontractor. SMS proved to be neither equipped nor qualified to produce the modules. Nevertheless, in July 2012, we worked with you amicably by allowing you additional time that was made necessary, at least in part, by SMS's poor performance. In exchange, you agreed that you would not be entitled to any additional time extensions due to future module delays.

III. MODULE DELAYS CONTINUED AFTER THE 2012 AGREEMENT

Despite the Consortium's assurances, module production did not improve after the 2012 Agreement. The Consortium issued a module delivery and assembly baseline schedule, dated August 10, 2012, as called for in the 2012 Agreement. That schedule contained a series of milestone dates, including the following on-hook dates for CA-20 and CA-01:

Activity	Unit 2 Milestone Date
CA-20 On-Hook	January 19, 2013
CA-01 On-Hook	May 28, 2013

The Consortium has not met these on-hook dates or any other milestone dates in that schedule.

A. Module Status In September 2012

As of September 27, 2012, at least thirty of the milestone dates had already come and gone without completion of the associated milestone event. By that time, only 31 of the 72 sub-modules for CA-20 had been delivered to the site. As a result of the module production and delivery delays, we wrote to you on September 27, 2012. That letter stated:

> Due to the current status of the structural modules, the Owner remains concerned that the late fabrication, delivery, and installation of structural modules will impact the Consortium's ability to meet the critical path schedule date of January 28, 2013[1] (CA20 on-hook date), and eventually to meet the revised Unit 2 Guaranteed Substantial Completion Date (GSCD) and possibly the Unit 3 GSCD. The Owner requests the

[1] This date was incorrect. The letter should have referenced a January 19, 2013 CA-20 on-hook date.

> Consortium continue to provide structural module status updates during the weekly project review meetings and other status updates as previously agreed. Also, beginning no later than October 10, 2012, provide bi-weekly written status updates on the fabrication, delivery, and installation of the structural modules, including information on any structural module issues. Finally, the Owner requests the Consortium review with the Owner the Consortium's documented contingency plans concerning the structural modules prior to October 19, 2012. These contingency plans should include, at a minimum, actions to be taken by the Consortium to meet currently scheduled structural modules CA01-CA05 and CA20 on-hook dates and installation dates to support the Project schedule.

The Consortium did not comply with any of these requests.

As of September 2012, you had still not resolved your NRC issues. The NRC performed an unannounced inspection on September 10-14, 2012, which led to another "Notice of Nonconformance" arising out of deficiencies in SMS's quality assurance program. The NRC documented this in its letter of October 24, 2012, which stated:

> During the inspection, the inspectors found that the implementation of your QA program did not to meet [sic] certain NRC requirements imposed on you by your customers or NRC licensees. Specifically, SMS failed to promptly correct conditions adverse to quality and significant questions adverse to quality, failed to effectively implement a corrective action regarding documentation of late entries in a quality records procedure, failed to preclude recurrence of significant conditions adverse to quality related to identification and control of items, and failed to perform adequate corrective actions associated with a nonconformance identified during a previous NRC inspection.

Shortly after this, the NRC advised CB&I of a "chilled work environment" at the Lake Charles facility, which was causing employees to believe that they "are not free to raise safety concerns using all available avenues" and that "individuals have been retaliated against for raising safety concerns."

B. Module Status In March 2013

By March 6, 2013, only 40 of the 72 sub-modules for CA-20 had been received. At our request, a meeting to discuss module production was held among executive officers in Columbia on April 9, 2013. Westinghouse did not attend the meeting, but CB&I was there and it promised that the Consortium would deliver four modules in the

second quarter of 2013, 40 modules in the third quarter, and 39 modules in the fourth quarter. It also informed us of a significant delay in the on-hook dates, as follows:

Activity	Delayed Unit 2 Date
CA-20 On-Hook	October 31, 2013
CA-01 On-Hook	September 4, 2014

The Consortium missed the revised CA-20 on-hook date of October 31, 2013 and, as of today, has yet to reach this milestone. The Consortium is also not on schedule to meet the revised CA-01 on-hook date of September 4, 2014.

C. Module Status In May 2013

By May 25, 2013, the Consortium had delivered only 41 of the 72 CA-20 sub-modules. And it had delivered only one of these in the preceding eleven weeks.

D. The Consortium Reported Schedule Delays In June 2013

On June 5, 2013, SCE&G publicly disclosed your statement to us that you would not be able to meet the required completion dates in the 2012 Agreement. We reported your estimate that completion of unit 2 would occur in either the fourth quarter of 2017 or the first quarter of 2018 and your estimate that completion of unit 3 would be "similarly delayed." Due to these delays, we also reported that SCE&G's 55% cost of the project could increase by $200 million. We noted that these schedule changes and cost increases resulted from "delays in the schedule for fabrication and delivery of sub-modules for the new units."

E. Module Status In July 2013

We saw no improvement over the next several months. By July 18, 2013, the Consortium had delivered only 44 of the 72 CA-20 sub-modules. This means that it had delivered only three modules in the preceding 11 weeks.

On August 7, we sent you another letter expressing our concerns about delays. On September 17, you advised us that, unless we objected, you would move the work of completing some CA-20 sub-modules from Lake Charles to the site. Your proposal was to move the uncompleted sub-modules into a temporary, onsite quarantine area to complete document processing and make minor repairs. We responded that we would not interfere with your decisions about how best to perform the work.

F. The Consortium Reported Further Schedule Delays In September 2013

On September 18, 2013, the executives of all involved companies met in Columbia. That meeting resulted in a September 25 letter from you, which included a schedule showing the following activities and dates:

Activity	Unit 2 Target Date	Unit 2 Late Date
CA-20 On-Hook	January 24, 2014	January 27, 2014
CA-01 On-Hook	July 18, 2014	September 18, 2014
Substantial Completion	December 15, 2017	December 15, 2017

Your letter also stated that:

> The Unit 2 CA01 sub-module delivery schedule is being reviewed to incorporate the latest information and will be transmitted to you by October 2, 2013. We have scheduled a management meeting on October 3, 2013, to review these deliverables with your team.

The promised October 2 letter and schedule showed that all CA-20 sub-modules would be delivered by November 4, and CA-01 sub-module shipments would extend between November 3, 2013 and July 18, 2014. The letter and schedule also introduced, for the first time, a CA-20 "minimum configuration" concept that we believe has the potential to further impede your ability to achieve timely project completion. This concept conflicts with the 2012 Agreement, and associated August 10, 2012 baseline schedule, which call for a complete (equipment loaded) CA-20 module to be set on its foundation by January 19, 2013.

Your October 2, 2013 letter went on to state:

> The Consortium is taking additional management measures to add certainty to this schedule. Resources have been added to engineering to reduce the backlog of E&DCRs and N&Ds and improve the turnaround time to disposition these items. Personnel from Lake Charles have been located at the V.C. Summer site to perform final inspections and document closeout. Resources have been added to the modules team to repair or rework any conditions identified on the sub-modules and prepare them for assembly. A daily Lake Charles Plan of the Day process has been implemented to drive schedule, elevate issues and resolve problems. Weekly CBI senior management review and monitoring of Lake Charles progress against the plan has been established. Milestone Managers are

being added to the site team to drive schedule and accountability for module assembly and placement. We believe that actions such as these will improve performance.

Although this letter does not amend the EPC Agreement or modify our commercial positions, we commit our support to the Project in achieving the schedules provided herein. We will maintain frequent and transparent communications with your staff to ensure that any significant change in schedule is raised and understood. We encourage SCANA to monitor our schedules and provide immediate feedback if they are not meeting your expectations.

Of the CA-20 sub-modules remaining to be delivered as of this date, seven were earmarked for delivery to the onsite quarantine area for completion of document processing and minor repairs. Those sub-modules were not ready to be incorporated into the construction.

Weekly module update calls began on October 14. By December, however, the level of participation by Consortium management had begun to wane. "Frequent and transparent" communications did not materialize, and we have not received "immediate feedback" when we have raised schedule issues.

In our letter of October 21, 2013, we stated:

You have represented that this schedule embodies the Consortium's realistic expectations concerning performance of Unit 2 work and its commitment to achieve Unit 2 substantial completion date by December 15, 2017.

We appreciate the Consortium's efforts in preparing these schedules and the Consortium's commitment to allocate additional resources and to perform as to achieve Unit 2 substantial completion by December 15, 2017. We must remind you, however, that the Consortium remains contractually committed to the dates for substantial completion stated in the July 11, 2012 Letter Agreement. As you correctly noted, the schedules in no way amend the Agreement. In the Letter Agreement, the parties agreed to a Unit 2 Guaranteed Substantial Completion Date of March 15, 2017, and a Unit 3 Guaranteed Substantial Completion Date of May 15, 2018.

G. Design Deficiencies Came To Light During September 2013 On-Site Assembly

On September 3, 2013, Westinghouse informed us that it had identified problems with the design of CA-04. The Consortium had planned to set that module on the Nuclear Island in September 2013, but it delayed that work because of the need to modify the concrete foundation. The foundation placement was then put on hold during the foundation redesign and associated procurement.

H. Module Status In December 2013

By December 4, 2013, all 72 CA-20 sub-modules had finally been delivered to the site, although 30 of them required documentation processing and repairs at the on-site quarantine area. The modification effort continued well into 2014.

On January 8, 2014, Westinghouse informed us that six Engineering and Design Coordination Reports (E&DCR) had to be completed before placement of CA-20. It also advised us that another sixteen E&DCRs would need to be completed after placement of CA-20, but before placement of wall concrete.

As of February 2014, none of the 47 CA-01 sub-modules had been delivered, although 20 should have been delivered by then, according to the October 2, 2013 schedule.

I. Module Status In March 2014

The Consortium has been providing our construction team with daily email updates relating to CA-20, but the updates continue to illustrate performance shortcomings. The March 11, 2014 email update reflected an on-hook date of March 31. The email updates of March 12 and 13 reflected the same date, but stated that such date was "in jeopardy" and pending management review. The March 14, 15, 17 and 18 email updates all reflected a date of April 7 for this activity. Those from March 20, 21, 22, 23, 25, 26 and 27 all stated that the April 7 date was "under review." Beginning on March 28, the email updates stated that the on-hook date had slipped again to May 10. In short, the projected on-hook date for CA-20 continues to slip and, by the end of March, we were farther away from completion of that activity than the Consortium had stated we were at the beginning of March.

The Consortium's progress with CA-01 has also been poor. Westinghouse has informed us that it is reviewing its design for that module and future changes could delay its placement. Due to these design issues, documentation approving placement of CA-01 is not expected until August 31, 2014.

IV. DESIGN ISSUES HAVE CONTRIBUTED TO THE PROJECT DELAY

A. IFC Design Delays

Other design issues, in addition to those identified above, have also delayed the project and are expected to contribute to future delays. Foremost among these is the delayed completion of Issued For Construction (IFC) drawings. The IFC percentage complete is the Consortium's primary metric for evaluating the status of design. That information shows that the Consortium has failed to meet expectations for design finalization and has misjudged its own performance.

The Consortium's early reports of design progress were optimistic. For example, in the March 17, 2011 Monthly Project Review minutes, the Consortium reported that it had delivered 90.49% of the scheduled IFC documents. As a result, the Consortium stated, "Design finalization is coming to an end and transitioning to support the Certified for Construction (CFC) design."

The May 19, 2011 Monthly Project Review minutes continued to reflect satisfactory progress. They reported Westinghouse's statement that design finalization was considered to be complete by the Department of Energy (DOE) and according to WEC's definition. The minutes also reported Westinghouse's estimate that the design was 95% complete. In addition, they reported Westinghouse's statement that the remaining engineering had been defined in a resource-loaded schedule, which it would use to monitor progress to completion.

The October 20, 2011 Monthly Project Review minutes reported Westinghouse's statement that site-specific engineering was winding down and that design finalization should be complete in the summer of 2012.

The Consortium began reporting design delays in May 2012, when you advised us that you would not meet the October 11, 2012 schedule for many of the IFC packages. On December 31, 2013, the Consortium reported to us that the IFC design documents were now only 94% complete. The Consortium continued this trend of revising design progress downward. On March 31, 2014, Westinghouse reported that the IFC documents were only 88% complete.

B. Design Issues Impact Nuclear Island Civil/Structural Work

Westinghouse's many design changes have also adversely impacted the Nuclear Island (NI) civil/structural work. One example concerns the A2 I wall in the Auxiliary

Building, which is a fairly simple reinforced concrete wall. Two of the construction packages are VS2-1210-COW-003 (rebar/embeds for I wall areas 4 and 5) and VS2-1210-CCW-001 (concrete for I wall areas 4 and 5). There were 109 unique E&DCRs between the two work packages. Ninety-two (92) of the E&DCRs were WEC initiated. This wall placement was delayed several weeks due to the design clarifications and changes.

C. Design Issues Are Requiring Multiple License Amendment Requests

The lack of WEC design maturity is evident in the high numbers of License Amendment Requests (LARs) and Departures to the Final Safety Analysis Report (FSAR) being submitted. As noted in the April 17, 2014 project status review meeting, 90 LARs have been identified; the NRC has approved 11 LARs; and 15 LARs are under NRC review. The following are three examples of these LARs and their importance:

- LAR 13-01/WEC LAR 54 (base mat shear reinforcement design spacing requirements) adversely impacted the schedule for Unit 2 nuclear island base mat concrete placement.

- LAR 13-02/WEC LAR 55 (base mat shear reinforcement design details revising the licensing basis from ACI 349 to ACI 318) also adversely impacted the schedule for Unit 2 nuclear island base mat concrete placement.

- LAR 14-01/WEC LAR 60 (Auxiliary Building structural details) has adversely impacted the schedules for construction of Auxiliary Building walls and floors and construction of structural module CA 20.

Furthermore, we anticipate that LAR 13-33/WEC LAR 53 (condensate return in the Containment Building) will impact construction progress. The same is true of LAR 14-07/WEC LAR 78 (CA04 tolerances); LAR 14-05/WEC LAR 72 – CA05; LAR 13-13/WEC LAR 02a (Turbine Building structural layout, which has been approved for Plant Vogtle); and LAR 13-14/WEC LAR 08 (Battery Room changes). We also anticipate that an LAR will be needed for coating thermal conductivity methods, which will impact Containment Vessel ring 1.

In addition to the LARs, the Consortium has also had a large number of Departures. The April 17, 2014 project status report states that 595 Departures have

been identified. Of these 237 are in process and 358 are in the queue. These Departures do not require NRC review but have the potential for impacting the project schedule due to Westinghouse's design changes.

V. OUR FRUSTRATION CONTINUES TO MOUNT

As a result of these events, our frustration continues to mount. You have made promise after promise, but fulfilled few of them.

We are aware that the Consortium is in the process of preparing yet another re-baseline of the project schedule. We are entitled to a re-baseline schedule that reflects all mitigation measures reasonably possible to ensure completion of Units 2 and 3 on or near the currently projected completion dates. Please note that this statement of our rights is not an acceleration order. The currently projected completion dates are already past the dates to which the parties agreed in the 2012 Agreement. The delays since then have been solely the Consortium's fault. Thus, you are contractually obligated to take the steps necessary to mitigate the delays at your own expense.

Your unexcused delays will cause our project costs to increase greatly. We intend to hold you strictly to all provisions of the EPC Agreement and expect you to reimburse us for all our additional costs.

We have prepared a preliminary estimate of the added costs associated with your most recent completion projections, that is, completion of unit 2 in either the fourth quarter of 2017 or the first quarter of 2018 and a similar delay to completion of unit 3. Based on such delays, we estimate that we will incur about $150 million in additional site costs, and will be entitled to about $100 million in liquidated damages. If you fail to meet your most recent completion projections, these amounts will be even higher. We are in the process of investigating other additional costs that we are incurring due to the unexcused delays or associated changes to your work plan. We will advise you of their categories and amounts once we have completed our investigation.

Any future delays to those projections will require further adjustments to the payment schedules.

VI. CONCLUSION

It is imperative that the Consortium demonstrate a renewed commitment to this project. To help achieve that, we wish to discuss these performance deficiencies and associated delays with you, as well as the measures that you intend to take to mitigate the delays. We also wish to explore with you the extent to which the Consortium's unexcused project delays constitute breaches of material provisions of the EPC Agreement.

Respectfully,

Lonnie N. Carter
President & CEO Santee Cooper

Kevin B. Marsh
President & CEO SCANA

Crosby, Michael

From: Crosby, Michael
Sent: Wednesday, October 14, 2015 1:12 PM
To: Carter, Lonnie
Cc: cwrau@bechtel.com
Subject: *** Confidential *** Bechtel Assessment (Preliminary - Bullet Notes)

Lonnie,

Carl has provided (you/me) preliminary bullet notes from the Assessment (see below) ... SCE&G has not seen this yet.

I do not see any real surprises ... the Bechtel projection on commercial operation dates is sobering.

***

Once a CEO meeting is scheduled ... Carl will work to schedule a sit-down meeting with Byrne & me ... and also a separate meeting with Jeff Archie's staff ... but he needs to get you and Kevin nailed down first.

Per Carl ... the CEO meeting is looking like the 22nd or 23rd ... Marty told me your schedule was better on the 23rd.

Thanks,
Michael

From: Rau, Carl [mailto:cwrau@Bechtel.com]
Sent: Tuesday, October 13, 2015 3:55 PM
To: Crosby, Michael
Subject: [EXTERNAL SENDER] Bechtel Assessment

Michael,

The attached is hot off the press, Preliminary Assessment, which will form the basis of our presentation to the execs. I did not include recommendations as they are still in development but will be part of the exec review.

Call with questions,

Carl

Scope of the Assessment

- Evaluate the status of the project to assess the Consortium's ability to complete the project on the forecasted schedule.
- Focus was not on cost.
- Team comprised of 10 senior managers from the following functional areas – Project Management, Construction, Project Controls, Engineering & Licensing, Procurement, and Startup.

Preliminary Findings

Project Management

- The project management approach used by the Consortium does not provide appropriate visibility and accuracy on project progress and performance.
- There is a lack of accountability in various departments in both the Owner's and Consortium's organizations.
- The Consortium's lack of project management integration (e.g., resolution of constructability issues) is a significant reason for the current construction installation issues and project schedule delays.
- The current hands-off approach taken by the Owners towards management of the Consortium does not allow for real-time, appropriate cost and schedule mitigation.
- The WEC-CB&I relationship is extremely poor caused to a large extent by commercial issues.
- The overall morale on the project is low.

Project Controls

- Our preliminary assessment of the project schedule is that the commercial operation dates will be extended:
  - Unit 2: 18-26 months beyond the current June 2019 commercial operation date.
  - Unit 3: 24-32 months beyond the current June 2020 commercial operation date.

  The probability range is approximately 50%-75%.
- The Consortium's forecasts for schedule durations, productivity, forecasted manpower peaks, and percent complete are unrealistic.
- The Owners do not have an appropriate project controls team to assess/validate Consortium reported progress and performance.

Construction

- Construction productivity is poor: Unit 2 is 2.3, Unit 3 is 1.6.
- Manual and non-manual sustained overtime is negatively affecting productivity.
- CB&I's work planning procedures are overly complex and inefficient, directly affecting craft productivity.
- Aging of the construction workforce is impacting productivity.
- The indirect to direct ratio is very high at 157% (typical mega nuclear project is 35-40%).
- Field non-manual turnover is high at 17.4% per annum.
- The current construction percent complete per month is only 0.5% versus plan of 1.3%.
- The workable backlog is significantly more than the current craft workforce.
- The project safety, housekeeping, and quality records are very good.

Engineering and Licensing

- Based on the team's observation of current civil work, the issued design is often not constructible (currently averaging over 600 changes per month). The complexity of the engineering design has resulted in a significant number of changes to make the design constructible.
- The construction planning and constructability review efforts are not far enough out in front of the construction effort to minimize impacts.

- Resolution of many Engineering and Design Coordination Reports (E&DCRs) is behind schedule. The E&DCR backlog is not decreasing.
- Engineering staffing remains extremely high for this stage of the project (around 800 total engineers for WEC and CB&I); however, the staffing is needed to complete the design and provide support to construction.
- There is significant engineering and licensing workload remaining for electrical design, I&C, post construction design completion, ITAAC closure, etc. Much of this remaining engineering will potentially impact construction.
- 119 license amendment requests (LARs) and 657 departures have been identified to date. This is a significant project workload that is well planned and scheduled and interactions with the NRC are good. Emergent issues potentially requiring NRC approval of LARs remain a significant project concern.

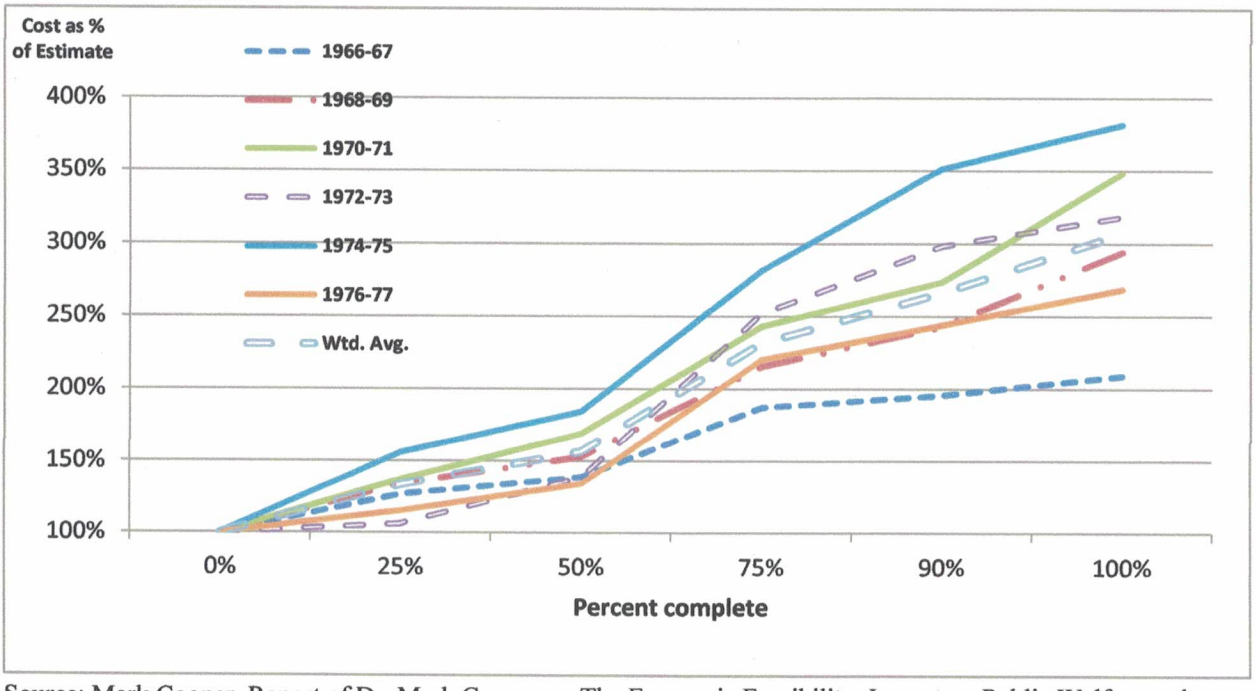
Procurement

- There is a significant disconnect between Construction need dates and procurement delivery dates. There are:
  - 457 open WEC and 2,907 open CB&I equipment deliveries.
  - 31 WEC and 28 CB&I POs to be placed.
- The amount of stored material onsite is significant creating the need for an extended storage and maintenance program. Inventory validation in the yard is only at 48% accuracy.
- The current min-max warehousing program is insufficient for the scale of the construction effort which is impacting productivity.

Startup

- The startup test program schedule is in the early stages of development.
- The current boundary identification package turnover rate appears to be overly aggressive and not consistent with the current construction completion schedule.

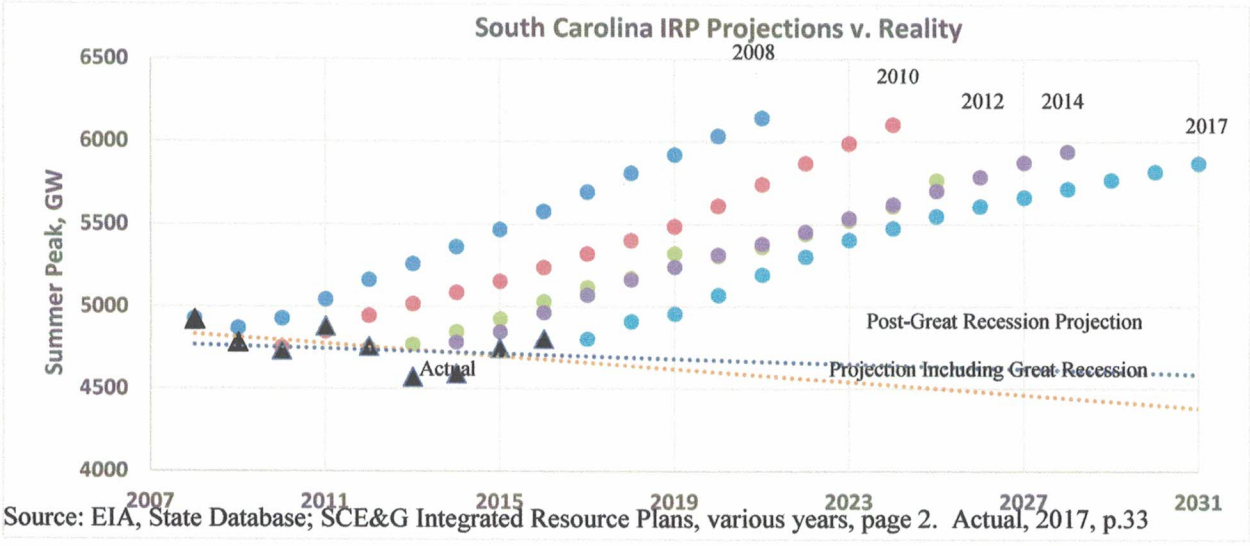
INCREASE IN COST ACROSS THE REACTOR CONSTRUCTION PERIOD



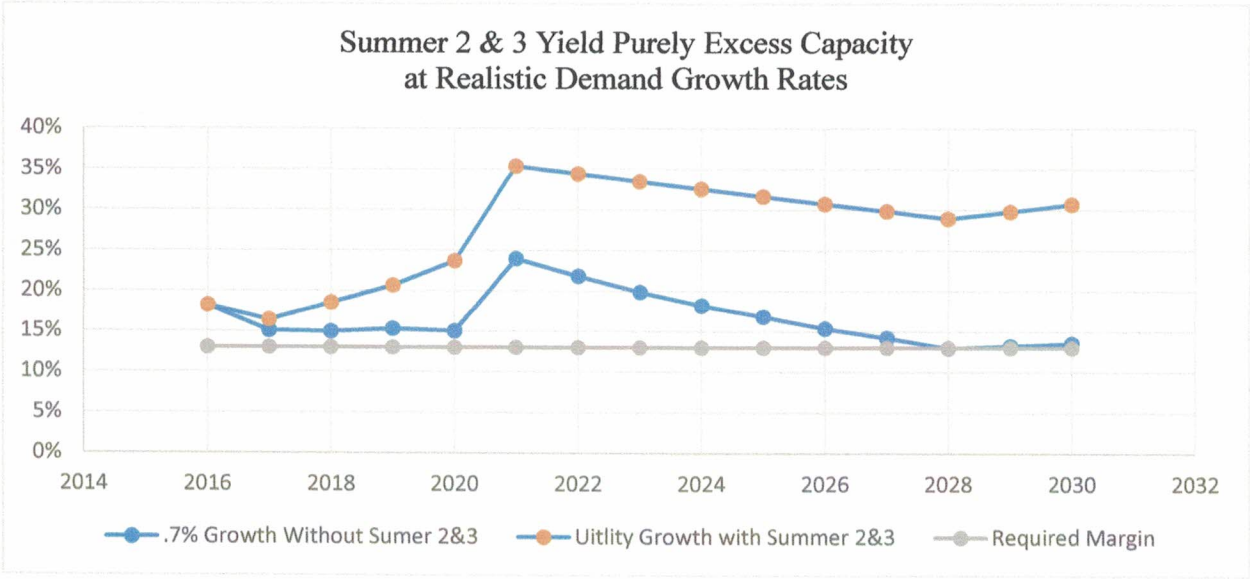
Source: Mark Cooper, Report of Dr. Mark Cooper on The Economic Feasibility, Impact on Public Welfare and Financial Prospects for New Nuclear Construction, Prepared For Heal Utah, July 5, 2013, p. 63. Data from Energy Information Administration, *An Analysis of Nuclear Power Plant Construction Costs,* 1995, p. xvi.

Henry Hub Futures Prices $/MMBTU

Source: Chicago Mercantile Exchange, Henry Hub Future Contracts, Testimony of John M. Lynch, p. 31.

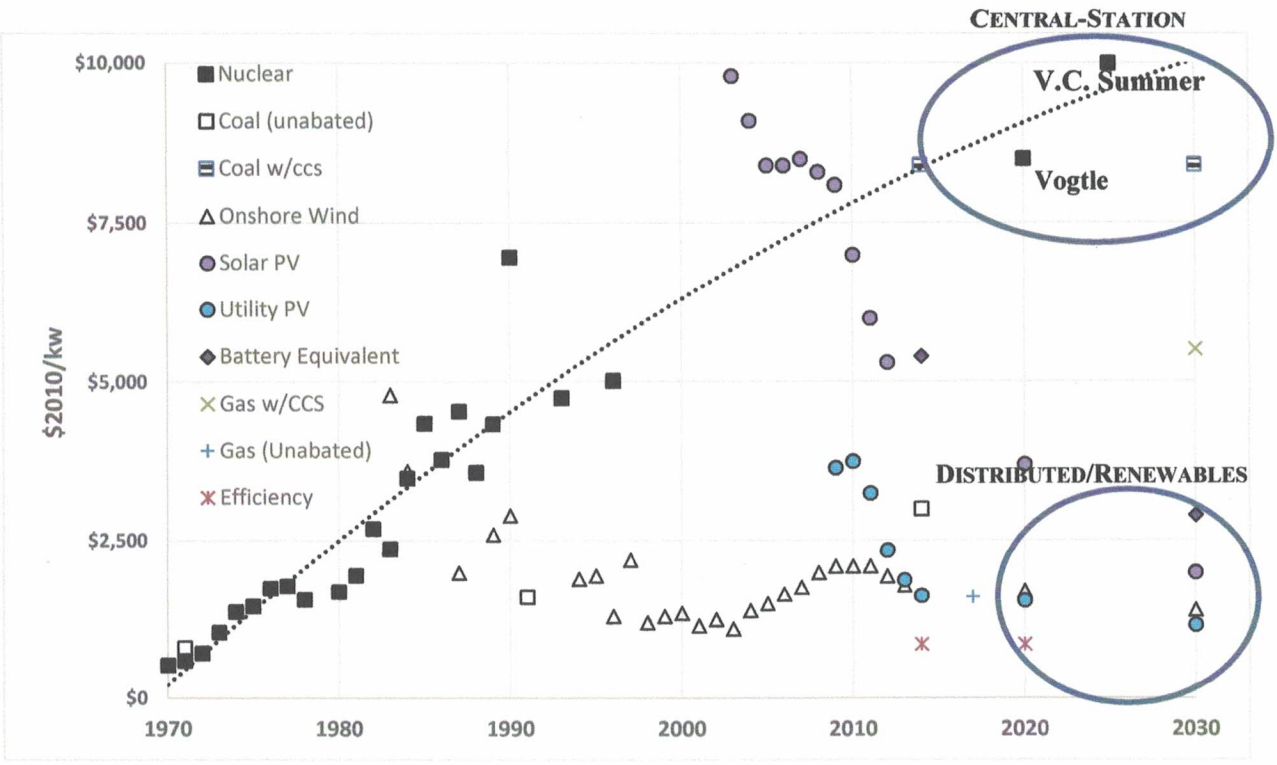


Source: EIA, State Database; SCE&G Integrated Resource Plans, various years, page 2. Actual, 2017, p.33



Source: Testimony of John M. Lynch, Exhibit No. JML-2.

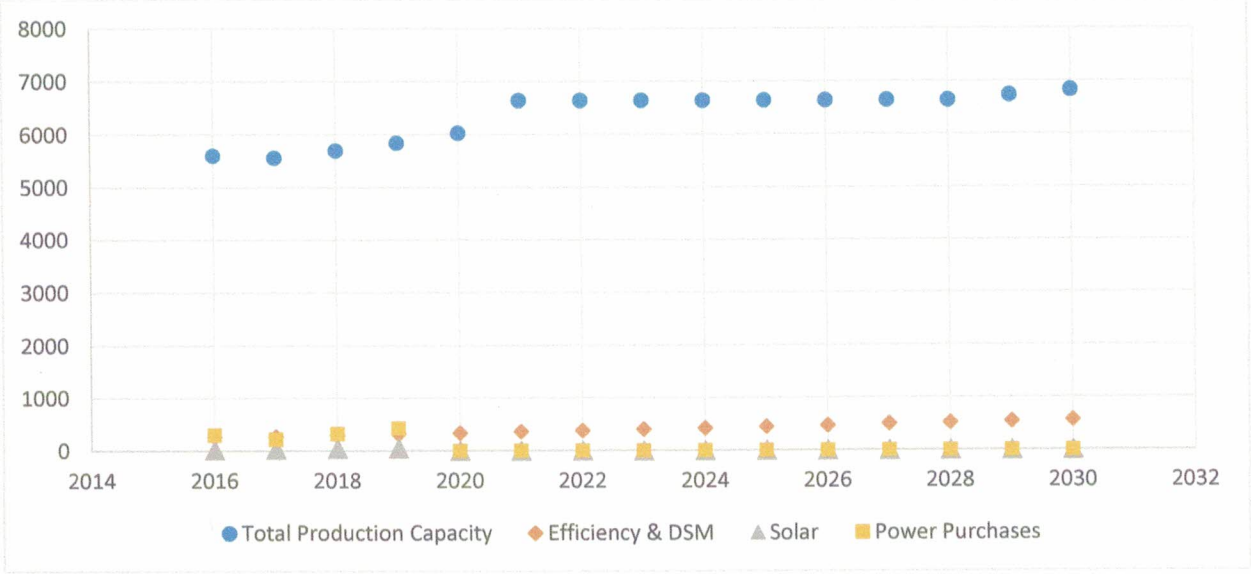
PAST, PRESENT AND FUTURE COST OF NUCLEAR POWER V. ALTERNATIVES



Source: Updated and adapted from Mark Cooper, *The Political Economy of Electricity: Progressive Capitalism and the Struggle to Build a Sustainable Sector* (Santa Barbara, Praeger, 2017), Figure 2.1 and accompanying text. (overnight cost for capital-intensive technologies, fuel-intensive technologies based on relative cost per kWh)

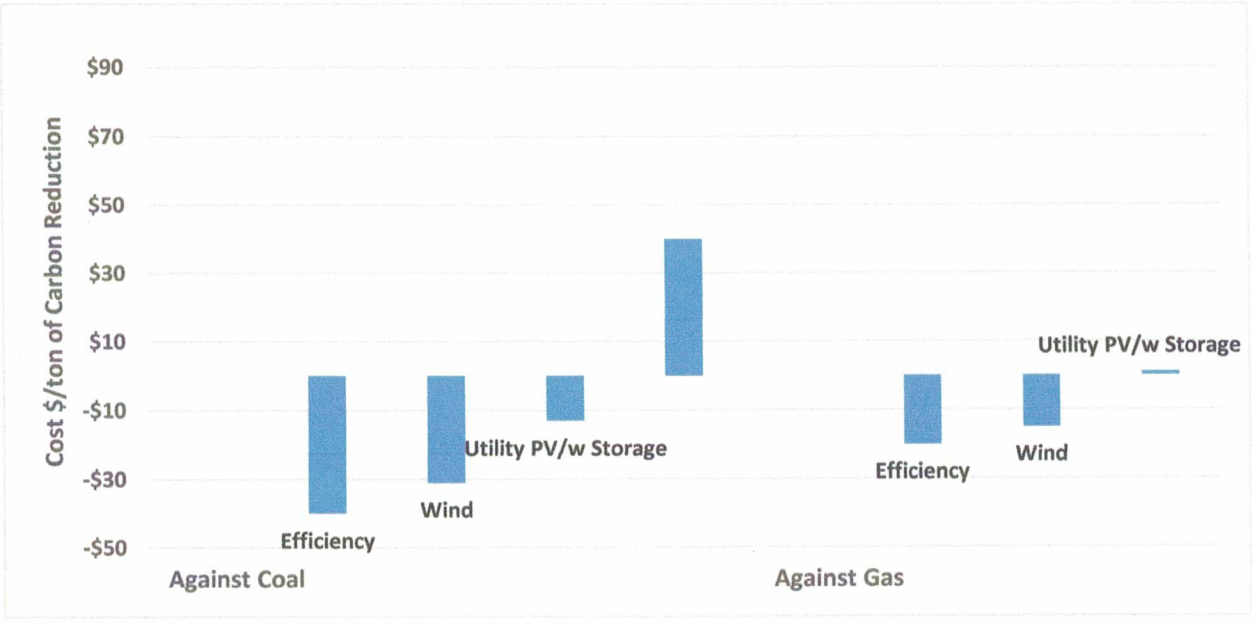
Nuclear Construction Crowds Out Alternatives

SCE&G Forecast of Summer Loads and Resources



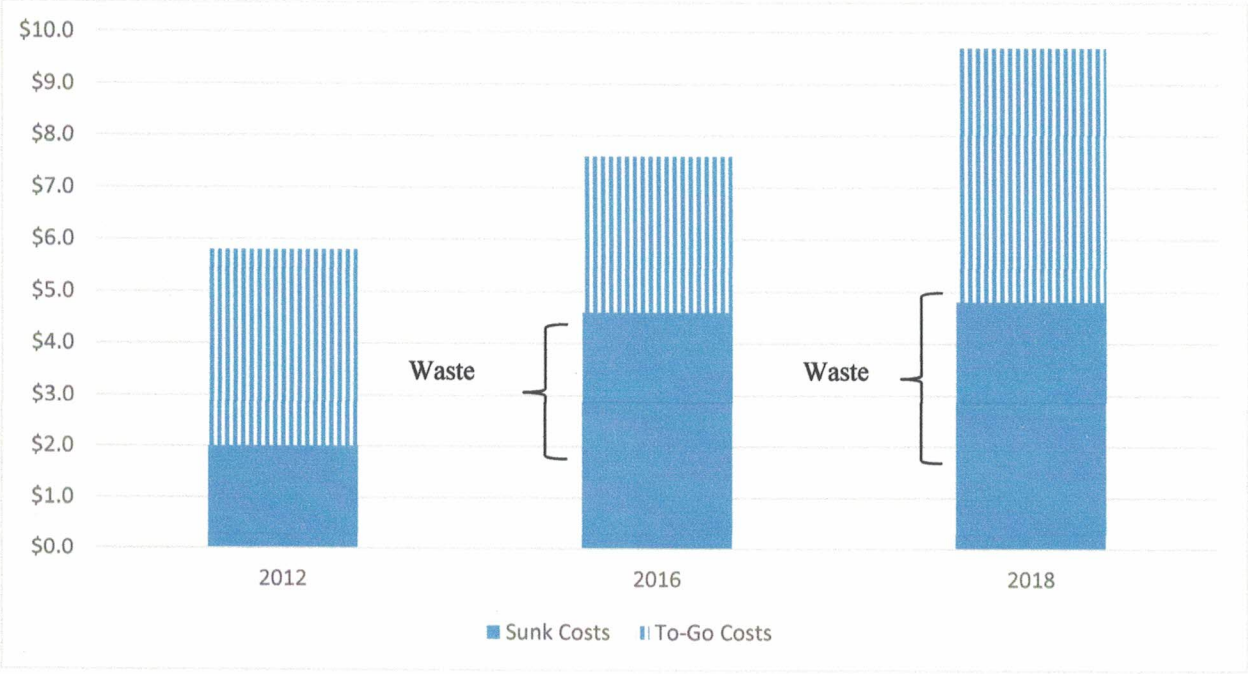
Source: Testimony of John M. Lynch, Exhibit No. JML-2.

FIGURE III-6: THE COST OF CARBON ABATEMENT



Source: Lazard, 2016. Lazard's Levelized Cost of energy analysis – Version 10.0. December, p. 6. Efficiency is from Lazard, 2015. Lazard's Levelized Cost of energy analysis – Version 9.0. November. p. 2. Lazard gives a range of 0-$50/MWh. The $35/MWh, is used in Mark Cooper. *The Political Economy of Electricity: Progressive Capitalism and the Struggle to Build a Sustainable Sector.* (Santa Barbara, 2017) Chapter 5.

Sunk Costs, To Go Costs and Waste



Source: Testimony of John M. Lynch, p. 30, Exhibit No. JML-2, Nuclear/Gas Generation Cost Study, Appendix 2, Comparative Economic Analysis of Completing Nuclear Construction or Pursuing a Gas Resource Strategy, September 27, 2012